

# Emerging Technology and Mobility Options Operating in City Right-of-Way

**Response to Statement of Legislative Intent 35-3-A-1-2019**



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**Seattle**  
Department of  
Transportation

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# 1.0 PURPOSE

As part of the 2019 Budget development process, the Seattle City Council adopted a statement of legislative intent (SLI) that asked the Seattle Department of Transportation (SDOT) to prepare a report on emerging technology and mobility options operating in City rights-of-way (ROW). Specifically, the Statement of Legislative Intent 35-3-A-1-2019 requested a report to include:

1. A **survey of anticipated new mobility options like scooters, “transit pods,” and other non-motorized vehicles, that may be coming to Seattle in the next three to five years;**

2. An **evaluation of other cities’ efforts** to address these emerging private transportation investments; and
3. A **strategy to integrate these options into the transportation network in a safe and sustainable manner**, including the possibility of utilizing bike lanes for these modes of transportation.

Council requested that SDOT report to the Sustainability and Transportation Committee and the Central Staff Director by June 1, 2019. This report is in response to the statement of legislative intent.

# 2.0 OVERVIEW

In the past few years, an increasing number of emerging mobility devices, services, and technologies have been deployed and are using the ROW—sidewalks, bike lanes, and street—and more are on the horizon. While these devices come in different forms, shapes, sizes, and ownership—personal, shared, or commercial fleet (not shared)—they share a common trait of trying to meet (latent) demand for a quick and cheap way to get around.

Here in Seattle, to be better prepared to capture the potential benefits of the growing number of “new mobility” options, SDOT produced the New Mobility Playbook 1.0 in September 2017. While the document does not explicitly define the types of vehicles or devices, it does refer to already allowed ride-share, car-share, and bike-share platforms—sometimes referred to as “mobility-as-a-service” (MaaS) or “transportation-as-a-service” (TaaS). The document describes “new mobility” as “new technologies and service innovations ... [that offer] more [transportation] options and more convenience.”

## 2.1 GUIDING PRINCIPLES

To guide emerging mobility innovations, the City uses the following guiding principles:

- Put People and Safety First
- Design for Customer Dignity and Happiness
- Advance Race and Social Justice
- Forge a Clean Mobility Future
- Keep an Even Playing Field
- Maximize Public Benefit
- Be Responsible Stewards of Public Resources

As the City continues to consider allowing newer mobility options—anticipated devices, vehicles, and technologies in the next three to five years—

to operate in the ROW, the City can use these principles as a springboard to craft clearer, more detailed definitions, policies, and regulations as part of the evolving decision-making process. Additionally, the City can make more informed decisions whether and how to integrate (or not integrate) these new mobility options into the transportation system in a safe, equitable, and sustainable manner.

## 2.2 WHAT ARE “NEW MOBILITY OPTIONS” AND “EMERGING USES IN THE RIGHT-OF-WAY”?

Broadly, “new mobility options” and “emerging uses in the right-of-way” range from car-share and ride-hailing services (like Lyft and Uber) to on-demand micro-transit to bike share, e-scooters, and other mobility devices like delivery robots and autonomous vehicles.

Personal vehicles that may carry one or two passengers and run on charged batteries are often referred to as “micro-mobility.” They include e-bikes, e-scooters, e-skateboards, and other relatively small and lightweight devices, compared to a car.

New mobility vehicles and devices offer mobility solutions that can help move people and goods and overcome “first-and-last mile” challenges. “First-and-last mile” problems refer to both movement of people and goods. For movement of people, it often applies to getting to and from transit stations, or the first-and-last shorter segments of a much longer trip. From a logistics perspective, the “first mile” refers to the movement of goods from a reseller to a courier service; and, the “last mile” refers to the final segment of goods movement to the end user.

# 3.0 SURVEY OF ANTICIPATED EMERGING MOBILITY OPTIONS

Per the scope of Council's request, for this report, "new mobility options" and "emerging uses in the right-of-way" refers to a subset of these terms that is limited to:

- Electric bicycles (e-bikes) and electric tricycles (e-trikes)
- Electric scooters (e-scooters)
- Other emerging transportation options:
  - Electric skateboards ("boosted boards")
  - Hoverboards, uni-wheels, and onewheels
  - Personal delivery devices (PDD) or delivery robots
  - Automated transit pods and goods delivery shuttles

**This report does not cover car-sharing, ride-hailing, micro-transit, or aerial drones.** Car-sharing and ride-hailing already exist as services, and the vehicles used in these services are motorized. Micro-transit, defined as a phone application-based transit service (not unlike "dial-a-ride" transit service) is also motorized. Aerial drones require airspace regulation, which is beyond the scope of this report.

## 3.1 FROM BIKES TO BOTS

For clarity and simplicity, the terms "emerging mobility" or "micro-mobility" may be used interchangeably to broadly refer to various emerging devices, vehicles, services, and technologies—from bikes to delivery robots—that are the main subjects of this report.

- Of these devices and vehicles, the **electric-assist bicycle (e-bike)**, either as part of a bike-share operation or as a privately-owned mobility option, is the most common. An **electric-assist tricycle (e-trike)** can be used for delivery and freight. Other versions can be used for

personal mobility. These include a fully-enclosed recumbent-style e-trike and "adaptive cycles," which is a type of e-trike that can be more readily used by people who cannot ride a traditional bicycle.

Seattle currently permits a free-floating bike-share program that provides residents and visitors an affordable, healthy way to get around the city. The initial pilot started in July 2017 and launched with three companies. The pilot tested the then brand-new technology of free-floating bike share – bikes that could be located and rented using a cell phone app and did not require traditional docking stations. Through September 2018, Seattle bike-share users took over 2 million total rides. Given the success of the initial pilot, another iteration of the bike-share permit now allows up to 20,000 bikes.

The initial pilot was not without its challenges. Learnings from the pilot include needed improvements in parking—how and where to park bicycles and more designated bike parking locations. Additional learnings include the need for better bike-parking reporting and monitoring tools, faster response to illegally parked bicycles, increased access options for people with lower incomes, and ongoing use of data and community-generated information for continuous improvement of the bike-share program. Many of these issues were addressed in the current permit and Seattle partners closely with cities across the country to share best practices and new ideas to ensure that free-floating bike-share remains a positive addition to the City's suite of transportation options.

- Shared **electric scooters (e-scooters)** are increasingly more common, having emerged in over 80 U.S. cities, and, in early- and mid-2018, with little to no regulation and causing a fair share of disruption. Although Seattle has yet to launch a shared e-scooter program, privately-owned e-scooters are increasingly being operated on Seattle's sidewalks, bike lanes, and streets.

In 2019, the City announced plans to develop a scooter share permit pilot program based on four non-negotiable principles: safety, fairness to riders, protection of the City (and taxpayers) through full indemnification, and equity. Over the next few months, SDOT will work with stakeholders and community members (including modal advisory boards, disability rights groups, transit agencies, residents, and businesses) to gather input that will be used to shape the pilot. The pilot framework will address hours of use, where scooters can be used, parking, helmet requirements, fines and enforcement, speed, data collection, and evaluation of a minimum threshold of bikes to remain as part of our bike share program.

- **Other emerging mobility devices** are also becoming more common.
  - Privately-owned **electric skateboards** or “boosted boards” are increasingly being used on City streets.
  - **Electric personal assistive mobility devices (EPAMDs)**, in this report, include two-wheeled “hoverboards,” electric unicycles or “uni-wheels,” one-wheeled skateboards or “onewheels.” Also defined as EPAMDs, but not discussed in this report because they are not new, are Segways or power-assisted, self-balancing wheelchairs.

- **Personal delivery devices (PDDs) or delivery robots** have also recently started operating on sidewalks in a few places across the country. These are usually operated as commercial fleet of devices.

The Washington State Legislature recently passed a law that allows these PDDs to operate on sidewalks. The devices may not weigh more than 120 pounds (lbs) or exceed a speed of 6 miles per hour (mph). Devices must yield to pedestrians and bikes at all times. Cities retain the authority to permit and/or disallow the devices from operating, if desired.

- **Transit pods (low-speed automated shuttles)** are another type of emerging mobility device operating in the right-of-way, though at a limited scale. Low-speed automated shuttles are currently being tested as transit circulators and for grocery delivery. These vehicles are also typically operated as a commercial fleet of vehicles.

The various emerging mobility devices are owned and operated in different ways. This requires different regulatory approaches to how these devices are managed and regulated, including, but not limited to, where in the right-of-way they are allowed to operate, at what speed, and, where and how they can be parked or stored.

Table 1 on the next page compares ownership models with the various types of devices. Table 2, at the end of this section, summarizes descriptions of the various devices covered in this report.

TABLE 1: DEVICE OWNERSHIP MODELS

Device	Private/Personal	Shared	Commercial Fleet (not shared)
E-bicycle	✓	✓	✓
E-tricycle	✓	✓	✓
E-scooter	✓	✓	
E-skateboard	✓		
EPAMDs (hoverboards, uni-wheels, and onewheels)	✓		
Personal delivery device/ delivery robot			✓
Automated transit pod			✓

Before taking a closer look at the definitions of the various emerging mobility devices, here is a brief **note about helmet laws**, which vary from place to place, as do levels of enforcement. At the state level, there is no law that requires helmet use when riding a bicycle. The Revised Code of Washington (RCW) 46.37.530, (1)(a)(iii), reads "...Persons operating electric-assisted bicycles and motorized foot scooters shall comply with all laws and regulations related to the use of bicycle helmets."

In Seattle and the rest of King County, the law requires bicyclists to wear helmets when riding on public property. Given that rule, people riding motorized scooters in Seattle are required to wear a helmet per state code. These City helmet rules also apply to people riding EPAMDs.

E-skateboards are not currently addressed in City code. They are improbably categorized as regular skateboards. No law requires use of helmets when riding a skateboard.

Helmet laws for the different types of devices and their corresponding ownership is a complex discussion. Resolving helmet regulations and enforcement is beyond the scope of this report. A more thorough deliberation, at a later time, will be necessary to clarify and solidify the City's position on how helmet rules are applied and enforced.

## 3.2 ELECTRIC-ASSIST BICYCLES

Electric-assist bicycles, or e-bikes, are similar to regular bicycles but have an integrated electric motor to help riders pedal. In some versions, the e-bike uses a handlebar throttle independent of the rider pedaling to provide electric-assisted propulsion. Per Washington State law, electric bicycles are categorized into three different classes. They are generally categorized by speed, and thus, where they are allowed to be ridden.

### 3.2.1 E-Bike Class 1

**Description:** A bicycle with an electric motor that assists the rider pedaling. The rider must pedal to activate the electric motor.

**Top Speed:** 20 mph; bikes can travel faster than that speed, but the electric motor does not provide assistance past 20 mph.

**Laws:** Class 1 e-bikes are generally treated like regular bikes; they can be ridden on sidewalks, multi-use trails bike lanes, and roadways.

### 3.2.2 E-Bike Class 2

**Description:** A bicycle with an electric motor that can both assist the rider pedaling or provide power independent of the rider pedaling through a throttle mechanism.

**Top Speed:** 20 mph; bikes can travel faster than that speed, but the electric motor does not provide assistance past 20 mph.

**Laws:** Class 2 e-bikes are generally treated like regular bikes; they can be ridden on sidewalks, multi-use trails, bike lanes, and roadways.

### 3.2.3 E-Bike Class 3

**Description:** A bicycle with an electric motor that assists the rider pedaling. The rider must pedal to activate the electric motor.

**Top Speed:** 28 mph; bikes can travel faster than that speed, but the electric motor does not provide assistance past 28 mph.

**Laws:** Class 3 e-bikes are allowed in bike lanes and roadways. They are not allowed on sidewalks or multi-use trails.

FIGURE 1: E-BIKES CAN CARRY CARGO OR CHILDREN



Source: *Outdoor Sportswire*. (<https://www.outdoorsportswire.com/electric-bike-company-rolls-back-tariffs/>)

### 3.3 ELECTRIC TRICYCLES

**Description:** Companies are also developing electric-assist tricycles. These three-wheeled pedal-assist vehicles can offer more stability than a traditional bicycle. They can be used to deliver light packages (like a UPS delivery trike) or as an “adaptive cycle” that offers an additional mobility option to people living with disabilities or others who are not comfortable on a traditional bicycle. Enclosed recumbent-style (rider seated in a traditional “chair” position) versions are also steadily becoming more common.

**Top Speed:** 20 mph; these devices can travel faster than that speed, but the electric motor does not provide assistance past 20 mph.

**Laws:** Per City and State codes, these devices are considered adaptive cycles. They are treated the same as e-bikes. While some e-trikes may be classified as Class 1 and Class 2 e-bikes, and may be ridden on sidewalks, multi-use trails, bike lanes, and roadways, e-trikes are used primarily in bike lanes and roadways, given their size.

FIGURE 2: DELIVERY E-TRIKE IN SEATTLE



*Image courtesy of UPS*

FIGURE 3: ENCLOSED RECUMBENT-STYLE E-TRIKE IN VANCOUVER, BC



*Images courtesy of VeloMetro Mobility, Inc.*

### 3.4 ELECTRIC SCOOTERS

**Description:** An electric motorized foot scooter has, typically, two or three wheels and that has handlebars. It has a floorboard that can to be stood upon by the operator. It is powered by an electric motor.

**Top Speed:** Per state law, scooters may be operated at a maximum speed of 15 mph on a roadway. Local jurisdictions may specify maximum speed if allowed on the sidewalk.

**Laws:** Per City code, scooters may be operated on roadways, shoulders, and alleys, but are prohibited on sidewalks, bicycle lanes, and public paths.

FIGURE 4: AN ELECTRIC SCOOTER IN AUSTIN, TX



Source: Ivan Alvarado/Reuters

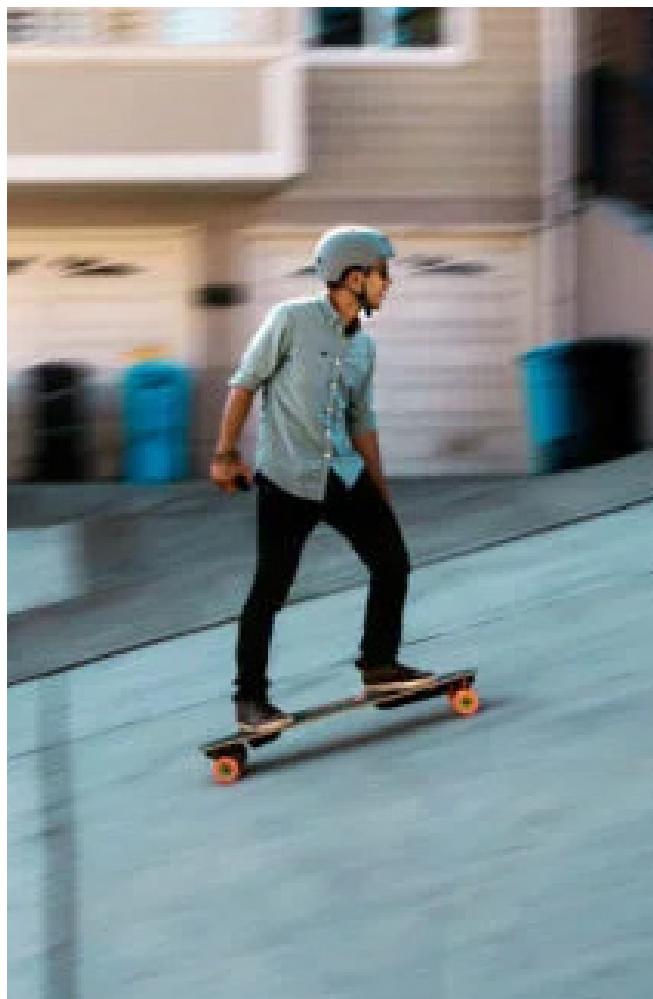
### 3.5 ELECTRIC SKATEBOARDS

**Description:** A skateboard with an electric-powered motor and small, handheld, wireless controller, often called a “boosted board.”

**Top Speed:** Some of these devices can reach 20-25 mph on flat ground.

**Laws:** Electric-powered skateboards are not addressed in City or State code and are therefore treated as skateboards, which must be ridden on sidewalks. Riding in the roadway or bike lanes is not allowed.

FIGURE 5: AN ELECTRIC SKATEBOARD OR “BOOSTED BOARD”



Source: <https://cleantechnica.com/2017/11/05/boosted-boards-dual-generation-2-review/>

### 3.6 ELECTRIC PERSONAL ASSISTIVE MOBILITY DEVICES (EPAMDS)

**Description:** Electric personal assistive mobility devices (EPAMDs) are either two wheels side-by-side or one-wheel self-balancing electric devices. They include hoverboards, uni-wheels or electric unicycles, and onewheels. These devices are closely related to Segway vehicles.

**Top Speed:** 20 mph on a paved level surface.

**Laws:** Per City regulation, EPAMDs may be ridden on roadways, shoulders, sidewalks, and alleys. They are not allowed in bicycle lanes or on public multi-use trails. Where an arterial street contains a sidewalk, EPAMDs must be operated only on the sidewalk and not up the roadway or shoulder. These devices are not allowed on roadways or shoulders where the speed limit is more than 35 mph.

FIGURE 6: A HOVERBOARD IN BERKELEY, CA



Source: Jim Wilson/The New York Times

FIGURE 7: UNI-WHEEL



*Image courtesy of Segway*

FIGURE 8: A ONEWHEEL IN SEATTLE



*Source: SDOT*

### 3.7 PERSONAL DELIVERY DEVICES

**Description:** “Cooler-sized” robots with a delivery compartment used to deliver packages to residences and businesses. These devices navigate along the sidewalk and crosswalks and are currently in testing in communities across the US, including in Snohomish County.

For safety and security, the robots are outfitted with nine cameras that are always recording and two-way audio to communicate with people they interact with.

**Top Speed:** 6 mph

**Laws:** The State recently passed House Bill 1325 that regulates personal delivery devices. State law limits these devices to sidewalks, crosswalks, and other pedestrian areas. It also limits the devices to a maximum speed of 6 mph and a weight limit of 120 pounds.

FIGURE 9: A DELIVERY ROBOT IN WASHINGTON, DC



*Image courtesy of Starship Technologies*

### 3.8 AUTOMATED TRANSIT PODS<sup>1</sup> AND DELIVERY SHUTTLES

**Description:** Several companies are beginning to partner with cities to use low-speed automated shuttles as automated transit circulators or delivery vehicles. These vehicles cannot travel faster than 25 mph and may be smaller and narrower than a traditional compact vehicle. As transit circulators, these devices can operate without a driver and carry up to 12 people. As automated delivery vehicles, they can carry and deliver a small payload—about four to six grocery bags.

**Top Speed:** 25 mph

**Laws:** State laws for low-speed vehicles require they travel in the roadway, and they are not allowed on state highways or streets with speed limits higher than 35 mph. Although some can physically park perpendicular to the curb, they are only allowed to do so when appropriately signed as angled parking. Note, the vehicles shown here may not meet the “low-speed vehicle” weight threshold defined by the National Highway Traffic Safety Administration (NHTSA). The nontraditional design of these vehicles (e.g., no steering wheel, no brake pedal, and non-standard seating arrangements) does not comply with current NHTSA rules, and they would need an exemption or waiver to legally operate in the right-of-way.

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<sup>1</sup>The automated “transit pods” and goods delivery shuttles described in this document do not meet the definition of neighborhood electric vehicles (NEVs) in Washington state code due to their size. NEVs include electric golf carts and similar vehicles and are currently human-operated, typically in campus settings like universities and retirement communities. Some pilots of automated NEVs have taken place (e.g., at Santa Clara University in 2016), but most automated shuttle pilots with transit or goods delivery use cases are using larger vehicles that don’t qualify as NEVs (see Low-Speed Automated Shuttles: State of the Practice for a summary of the over 250 domestic and international pilots that have made use of these emerging vehicle models).

FIGURE 10: A TRANSIT POD BEING TESTED IN DENVER



*Connects commuter transit station and park-and-ride with nearby employment offices. Image courtesy of EasyMile*

FIGURE 11: AN AUTOMATED DELIVERY VEHICLE BEING PILOTED IN SCOTTSDALE, AZ



*Image courtesy of Nuro*

TABLE 2: SUMMARY OF EMERGING MOBILITY DEVICES FOR THIS REPORT

Device	Description	Top Speed	Allowed				Comments
			Sidewalk	Bike Lane	Roadway	Multi-Use Trail	
E-bike, Class 1	A bicycle with an electric motor that assists the rider pedaling. The rider must pedal to activate the electric motor.	20 mph	✓	✓	✓	✓	Generally treated like regular bikes. Can travel faster than 20 mph, but the electric motor does not provide assistance past 20 mph.
E-bike, Class 2	A bicycle with an electric motor that can both assist the rider pedaling or provide power independent of the rider pedaling through a throttle mechanism.	20 mph	✓	✓	✓	✓	Generally treated like regular bikes. Can travel faster than 20 mph, but the electric motor does not provide assistance past 20 mph.
E-bike, Class 3	A bicycle with an electric motor that assists the rider pedaling. The rider must pedal to activate the electric motor.	28 mph		✓	✓		Can travel faster than 28 mph, but the electric motor does not provide assistance past 28 mph.
E-trike	Three-wheeled pedal-assist vehicles.	20 mph	Same as e-bikes classes under state and local code				Can travel faster than 20 mph, but the electric motor does not provide assistance past 20 mph.
E-scooter	An electric motorized foot scooter that is designed to be stood upon and generally has 10-inch or smaller wheels.	20 mph			✓		Also allowed on shoulders and alleys.
E-skateboard	A skateboard with an electric-powered motor and small, handheld, wireless controller, often called a "boosted board."	20 mph	✓				Electric-powered skateboards are not addressed in City or State code; treated as a regular skateboard.
Electric Personal Assistive Mobility Device (EPAMD)	Devices with either two wheels side-by-side or one-wheel self-balancing electric devices; include hoverboards, uni-wheels or electric unicycles, and onewheels.	20-25 mph	✓		✓		Also allowed on shoulders and alleys. Where an arterial street contains a sidewalk, EPAMDs must be operated only on the sidewalk.
Personal Delivery Device (PDD) or Delivery Robot	"Cooler-sized" robots with a delivery compartment used to deliver packages to residences and businesses.	6 mph	✓				Robots have multiple cameras that are always recording and two-way audio communication capability.
Automated Transit Pod	Low-speed automated shuttles as automated transit circulators or delivery vehicles.	25 mph			✓		Not allowed on streets with speed limits higher than 35 mph.

# 4.0 COMPARABLE CITIES' EFFORTS ON EMERGING MOBILITY

## 4.1 STATE OF THE PRACTICE

Along with potential benefits and opportunities, emerging mobility devices also present potential constraints and conflicts. Collectively, these will force cities, including Seattle, to more holistically consider allocation of the right-of-way to address emerging mobility options.

Cities nationwide have begun to address emerging mobility devices and technologies primarily through three channels (not necessarily in this order and sometimes iteratively):

- Determine if, where, and how the devices should be ridden and parked
- Make necessary updates to City or State code to reflect these new devices
- Develop pilot programs to test and better understand the mobility implications of these emerging mobility options

No one city has fully figured out how to comprehensively address emerging mobility. Hence, for many cities, figuring out the right set of rules has been through experimentation—using pilots and demonstration projects—and sharing experiences with other cities to find the best set of rules specific to their city.

For this report, we reviewed the emerging mobility policies and practices of over 20 notable comparable cities in the United States and a few international cities. Most of the current literature and legislation focuses on shared mobility (e.g., shared bikes and e-scooters). Increasingly, though, other commercial mobility platforms are undergoing pilots, especially for goods movement and delivery. Regulations over use and management are still somewhat limited; however, these devices demand space in the right-of-way and require appropriate regulation.

Emerging mobility devices, from bikes to robots, present a complex set of considerations for how to manage the right-of-way. The following is a summary of noteworthy emerging mobility innovations in different cities. Highlighted are the insights or main learnings from these cities, organized from general emerging mobility strategies to specific devices or vehicle type. A more detailed city-by-city evaluation can be found in Appendix A.

## 4.2 NOTEWORTHY EMERGING MOBILITY STRATEGY INNOVATIONS

### 4.2.1 Clear Definitions of Emerging Mobility Devices and Vehicles and Overarching Guiding Principles

Few jurisdictions have dedicated emerging mobility programs. Leading among them is the San Francisco County Transportation Authority (SFCTA) in partnership with the City of San Francisco.

- Dedicated program – The SFCTA has a dedicated emerging mobility program that has produced clear definitions of emerging mobility devices, services, and technology.
- Set of guiding principles – They also adopted a set of clear guiding principles that serve as framework for evaluating emerging mobility services and technology. It helps with identifying ways to meet city goals, shape future studies, policies, and programs. The ten guiding principles address:

1. Collaboration
2. Safety
3. Transit
4. Congestion
5. Sustainability
6. Equitable Access
7. Accountability
8. Labor
9. Disabled Access
10. Financial Impact

Because these principles encompass all emerging mobility options (including transportation network companies and automated vehicles), individual principles may not apply to all types of devices, services, and technology. Collectively, they provide a framework for achieving success in working with commercial service providers of these emerging mobility services.

#### **4.2.2 Dockless Vehicles: Prohibitions, Pilot Programs, Data, and Usage Rules**

- **Prohibitions** – New York City does not allow the use of e-scooters on its streets or sidewalks. London also does not allow e-scooters on public streets or sidewalks or other public spaces like parks, plazas, and multi-use paths.
- **Pilot programs for continuous improvement of policy and regulation** – Like Seattle's approach to piloting bike share, many cities have employed pilot programs to test shared fleets of e-bikes and e-scooters. Pilots are specifically used to test regulations and approaches to integrating transportation services. Findings from pilots are then used to inform the creation of policy and regulations.
- **Data gathering and community engagement to gain deeper insights and understanding of issues and opportunities** – Baltimore, Portland (OR), and Austin have completed the most thorough and thoughtful pilots with lessons for Seattle. The e-scooter pilot program reports from Baltimore and Portland include excellent approaches to community engagement and data-gathering. In addition to data gathered by contracted companies, Baltimore and Portland conducted community and user surveys, held focus groups, and hosted meetings for community feedback.

In focus groups, Portlanders expressed enthusiasm about e-scooters and concerns about racial profiling in policing. Most community concerns about e-scooters were about inappropriate sidewalk use.

Austin created rules for micro-mobility companies that give the City's department of transportation access to data, similar to the mobility data specifications that Seattle employs for bike share. Austin is able to share the data publicly, including maps and a dashboard of micro-mobility use. Austin also addresses user privacy in its rules for micro-mobility companies, including a prohibition on selling user data to third parties. Finally, Baltimore and Austin have transparent procedures for integrating some emerging mobility devices into their existing transportation system and the existing right-of-way.

- **Outlining future work plan or next steps for creating policies and regulations** – Baltimore created the Dockless Vehicle Committee, comprised of City staff from departments of transportation, police, law, sustainability; a councilmember; a mayor's office representative; and representatives from several interest groups, including the bicycling advisory committee, the downtown partnership, and waterfront partnership. The City assigned the committee a work plan to begin taking steps to address issues and craft policies for dockless vehicles in the city. Similarly, Austin outlined in a memo to the mayor and city council their steps for creating rules surrounding e-scooter usage, including resident input.

- **Controlling where and how bikes and scooters can operate** – Most cities reviewed in the survey only allow shared e-bikes or e-scooters in bike lanes, with some variations and exceptions. Some cities, like San Diego and Washington, DC, restrict usage in certain districts or automatically slow down devices to 2 mph and alert riders in “no ride zones,” either through the phone app or a signal device on the e-scooter.

In January 2019, Denver changed their rules for where e-scooters may operate. The new regulations state e-scooters should operate primarily in bike lanes. Where there is no bike lane, e-scooters may operate on the far right side of the road, but only if the speed limit of that road is no more than 30 miles per hour. Denver worked with operators to ensure that the new rules are reflected in communications and guidance to users within the city.

- **Managing parking clutter** – Austin and Santa Monica have installed marked parking “drop zones.” They include designated parking areas on the sidewalk and in-street parking corrals. Some companies have placed sensors—from GPS to cameras, or both—in their devices to help users park in proper locations. Some companies have also required users to take a picture of how they parked the device in order for the company to track patterns of good and bad parking behavior.

- **E-trike pilots and limited testing approach** – Beyond bicycles and scooters, electric tricycles are also increasingly using the right-of-way. In Vancouver, BC, shared enclosed electric-assist tricycles are being piloted at the University of British Columbia campus. In Seattle, UPS is piloting an electric pedal-assist cargo tricycle for deliveries in areas where it’s difficult for trucks to access or find parking. E-trikes are classified like e-bikes, thus are allowed to operate where the different classes of e-bikes are allowed to operate. But given that they are substantially bigger than a typical e-bike, e-trikes operate primarily in a bike lane or in a vehicle lane.

- **Enforcement** – Like bike helmet laws in Washington State, regulations that apply to micro-mobility devices vary from place to place and are enforced unevenly. In Portland, the new set of rules for their second e-scooter pilot enable the City to fine violators \$50 for riding on the sidewalk and \$15 for parking illegally. In Paris, the City imposes a €135 (about \$151) fine for riding on the sidewalk and a €35 (about \$39) for blocking the sidewalk with a parked scooter.

In Santa Monica, police have strongly enforced right-of-way laws. On a popular beach bike path, but prohibited for e-scooters, police have regularly stopped violators and gave them a choice: give up the scooter or get a ticket. In one week in 2018, police stopped 196 people riding scooters and issue 92 tickets for various violations.

Where e-scooters have seemingly invaded cities overnight—from San Francisco to Denver to Paris to Santa Monica, among many others—the cities’ enforcement departments have removed and impounded illegally parked e-scooters blocking sidewalks, ramps, building entrances, and bus stops.

### 4.2.3 Personal Delivery Devices

- **Setting preliminary usage**

**regulations** – Though not as prevalent as e-bikes or e-scooters, personal delivery devices (PDDs) are appearing in more state and city codes. Currently, Virginia, Idaho, Wisconsin, Arizona and Ohio have regulations defining and setting preliminary usage restrictions for PDDs. Washington, DC, code Chapter 15C includes a definition of a PDD and establishes regulations for operations (limited to sidewalks and crosswalks connecting sidewalks), licensing, and running a pilot program. The operation restrictions notably regulate speeds, maximum weight limits, and braking technology.

- **Embrace the technology approach** – The largest delivery robot pilot is currently underway in Milton Keynes, England, a city of about 250,000 people just outside London. Starship Technologies started testing hundreds of delivery robots in the city in late 2018 in the first full-scale use of the technology. Findings from this pilot are expected in 2020.

### 4.2.4 Other Devices

- **Tailor regulations to ensure pedestrian safety** – Electric-powered skateboards and other privately-owned electric personal assistive mobility devices (EPAMDs), like hoverboards, electric uni-wheels, and onewheels, are also increasingly becoming a popular form of personal mobility. These devices can reach speeds up to 20 mph, and users ride them on the sidewalk, in bike lanes, and in the street, depending on their speed of travel and the available infrastructure. They may cause conflicts on sidewalks when ridden above 3 mph.

Rules for these devices vary from city to city. Some cities ban them altogether, some prohibit them from specific high pedestrian-traffic business districts, and others allow them on sidewalks so long as they yield to pedestrians.

- **Very limited pilots** – Other emerging transportation technologies are automated “transit pods” and goods delivery shuttles. The City and County of Denver is testing this technology in partnership with the Regional Transit District. The pilot project, called 61AV, is currently underway and allows an automated “transit pod” to circulate on a fixed route to connect a commuter transit station to nearby employment offices.

In Scottsdale, AZ, the City allowed a pilot using an automated delivery vehicle larger than a personal delivery device. Robotics company Nuro and Fry's Food grocery stores (owned by Kroger) partnered to test self-driving delivery vehicles to deliver groceries. The pilot was limited to one zip code in the city and Kroger ended the pilot in mid-March 2019. Findings from the pilot are not yet published, and a release date has not yet been announced.

# 5.0 STRATEGY DEVELOPMENT RECOMMENDATIONS

## 5.1 STRATEGY CONSIDERATIONS

It is critical for cities to fully define emerging mobility devices and technologies to eliminate confusion in regulation and use of the devices. For example, until January 2019, a state law in Colorado classified electric scooters as “toys,” which allowed them to be used only on sidewalks. In the United Kingdom, legislators are considering revising the Highway Code to allow testing and use of electric scooters. These examples result from having vague or nonexistent definitions of new micro-mobility technology.

Seattle currently has definitions for e-bikes and could benefit from an upgraded set of definitions for the other emerging mobility devices. We could apply a similar tiered system based on the electric assistance power, top speeds, size, and general application, which would distinguish them from motorcycles, non-powered bicycles, and non-powered scooters.

With clarity in definitions of what these emerging mobility devices are, the City must next define where these devices can be used and parked. Many cities and states do not explicitly mention e-bikes, e-scooters, EPAMDs, and other emerging mobility devices in regulatory ordinances concerning sidewalks, bike lanes, and streets.

By their nature, many of these “dockless” devices are parked on or near sidewalks after users complete their trips. This can present safety and accessibility issues, as those who are elderly or mobility impaired may have their paths blocked by improperly parked devices. Various cities and states regulate the distance from the curb to the edge of the pedestrian clear zone where these devices can be parked, with some providers asking users to submit photos of correctly parked devices.

As the City considers regulating use of these emerging mobility devices in the right-of-way, we need to holistically consider the allocation and management of the right-of-way and how to manage commercial operations of these devices. In contrast to many other cities, Seattle’s ROW is relatively narrow, with much competition for limited space—in the travelway, flex zone, and pedestrian zone. The City’s Comprehensive Plan, “Seattle 2035,” defines six essential functions for the ROW:

1. Mobility
2. Access for People
3. Access for Commerce
4. Activation
5. Greening
6. Storage

Within the mobility function, however, formal guidance is lacking on how to prioritize amongst traditional modes of autos, transit, pedestrians, bicycles and freight; emerging mobility modes further necessitate the need for this exercise.

## 5.2 COMMUNITY INPUT

As part of our efforts to investigate potential next steps to address emerging mobility options, we not only investigated best practices from other cities, we listened to transportation stakeholders here in Seattle. In March 2019, SDOT convened a focus group to listen to representatives from the Bike Advisory Board, Pedestrian Advisory Board, Transit Advisory Board, Commission for People with disAbilities, Disability Rights Washington, National Federation of the Blind, Seattle Neighborhood Greenways, and Washington Bikes. (Invitations to participate were sent to the Freight Advisory Board and the Planning Commission, but they were not able to send any representatives.)

The focus group addressed four main questions:

### **1. What are the benefits and opportunities?**

The responses addressed potential for helping reduce pollution; potential to increase overall safety by reducing car use; potential to increase equity, more travel options for all ages; potential for improved access to transit; and potential for opportunity to rethink allocation of the City's right-of-way for safer movement and staying (non-movement) activities.

### **2. What are the challenges and drawbacks?**

The focus group noted issues primarily about limited space for all of these new devices. The group had deep concerns about safety, speed, and likely conflicts on the sidewalks with pedestrians and people with disabilities. And of course, parking—illegally parked devices that block the pedestrian zone and create clutter in the public realm.

### **3. Where should these emerging technologies operate?**

The response ranged from “absolutely not on sidewalks” to “allow on sidewalks, maybe, in some cases” to “only in bike lanes” to “regulate by speed”—devices at slower speeds (about 3 mph) may operate on sidewalks, faster devices should be in the bike lane. The group, however, generally agreed that these devices and pedestrians have limited space to work within the existing right-of-way. Considering micro-mobility and where they should operate presents an opportunity to rethink, reallocate, and modify the right-of-way to have dedicated space for these devices—create a “low-intensity travel lane” or multi-modal “go” lanes to accommodate bikes and a select set of these micro-mobility devices.

### **4. How should the City manage emerging technologies in the right-of-way?**

The focus group generally agreed that the City's highest priority should be safety for all users, and the City can only do that by allocating right-of-way for all users to have enough room to be safe. This is the opportunity for the City to rethink the right-of-way to accommodate movement for all users while also ensure enough space for access, sidewalk cafés, goods delivery, utilities, etc. The City can do this with a focus on equity, including, among other actions, emphasizing that the right-of-way is for everyone. The City would also need to ensure better parking requirements, employ curb-space management, follow best practices from other cities, and use data to learn and help continuously improve these new mobility services.

See Appendix B for a more complete summary of the focus group meeting.

## **5.3 NEXT STEPS**

### **5.3.1 Overview**

Emerging mobility devices and technologies hold the potential to help us manage congestion, reduce carbon emissions, provide affordable mobility options, and achieve equitable outcomes. To realize the potential benefits of emerging mobility devices and minimize negative impacts, however, we must consider right-of-way management more holistically—from allocation of ROW, to curb and sidewalk management, to street design and enforcement—not only for mobility but also in consideration of other essential functions in the right-of-way.

The roadmap outlined in this report to address emerging mobility needs encompasses both a significant planned action (shared e-scooter pilot program) and series of potential actions that have yet to be resourced. The range of activities could include experimentation through pilot programs; policy and legal framework upgrades;

education and enforcement; data collection and analysis; and updates to design standards and consideration of right-of-way allocation.

In doing so, we can better meet user needs by defining expectations for where and how these devices operate on our sidewalks, bike lanes and

streets, and how we will collaborate with service providers to ensure success in deployment and integration into Seattle's transportation system. Table 3 summarizes the set of potential next steps.

TABLE 3: SUMMARY OF POTENTIAL NEXT STEPS

Category	General Findings	Potential Next Steps
Pilot Programs	Pilot programs allow the City to gather data and evaluate the benefits, opportunities, and challenges of any new product or service. They give the City time to test and iterate appropriate regulations, educational efforts, and fees. Pilot programs also send a clear signal to the market that we are open to embracing these new technologies, so long as these emerging mobility services and technologies comply with the City's multi-pronged transportation goals regarding, but not limited to, safety, equity, and sustainability.	<ul style="list-style-type: none"> <li>Prioritize equity within pilot program framework and establish appropriate indemnification requirements.</li> <li>Carry out partnerships and collaborate with commercial business operations.</li> <li>Conduct pilot programs to test emerging mobility options before launching any large-scale permit program.             <ul style="list-style-type: none"> <li>Develop a shared e-scooter pilot program (underway).</li> </ul> </li> </ul>
Policy and Legal Framework Upgrade	The City's policies and legal framework do not clearly address newer emerging mobility devices. A deeper dive review of the Seattle Municipal Code, SDOT policies, and state laws, can help to clarify which regulations need to be upgraded.	<ul style="list-style-type: none"> <li>Prioritize equitable outcomes and fairness within policy and legal framework.</li> <li>Review and upgrade regulations.</li> <li>Refresh City's existing principles.</li> <li>Clearly define where emerging devices can operate and legally park.</li> <li>Revisit modal priority to inform regulations.</li> </ul>
Education and Enforcement	Education and enforcement efforts are important and essential to safe operation of any device. Clear guidance on regulations and operations that can be easily communicated are key to a successful campaign.	<ul style="list-style-type: none"> <li>Prioritize proper training for law enforcement related to emerging mobility; ensure equity in enforcement.</li> <li>Introduce clearer wayfinding and signage (including digital information).</li> <li>Increase training and education of authorities on the street to help users of emerging mobility better understand the evolving rules and regulations.</li> </ul>
Data Collection and Analysis	Data is paramount to measuring and understanding how, when, where, and for what kind of trips people are using different types of emerging mobility devices.	<ul style="list-style-type: none"> <li>Collaborate with commercial service providers to gather data and gain insights from that data. Use data to better understand deployment needs and modify regulations and perhaps even ROW design accordingly.</li> <li>Use existing City protocols to gather data about privately-owned devices.</li> </ul>
Design Standards and Right-of-Way Allocation	Micro-mobility devices and technologies are currently operated and allowed throughout the city. It is not completely clear, however, where newer devices like e-scooters, EPAMDs, and personal delivery robots are allowed. How the City chooses to accommodate where and how emerging mobility—existing and future devices—should be used has implications for the design and allocation of right-of-way.	<ul style="list-style-type: none"> <li>Consider designation of low-intensity travel lanes in strategic locations.</li> <li>Integrate emerging mobility devices into street design guidelines</li> <li>Manage the sidewalk             <ul style="list-style-type: none"> <li>Allow limited use of select devices on sidewalks.</li> <li>Provide marked parking spaces or zones.</li> </ul> </li> </ul>

## 5.3.2 Planned Action

Over the next few months, SDOT will work with stakeholders and community members (including modal advisory boards, disability rights groups, transit agencies, residents, and businesses) to gather input that will be used to shape an e-scooter pilot. The pilot framework will address hours of use, where scooters can be used, parking, helmet requirements, fines and enforcement, speed, data collection, and evaluation of a minimum threshold of bikes to remain as part of our bike share program. Four non-negotiable principles will ground the pilot: safety, fairness to riders, protection of the City (and taxpayers) through full indemnification, and equity.

## 5.3.3 Potential Next Steps

Beyond the e-scooter pilot, SDOT is not currently resourced or programmed for additional next steps. If, however, the City is to move ahead with allowing other emerging mobility devices, services, and technologies to operate in the right-of-way, based on the best practices survey and community focus group, potential next steps include:

- **Pilot Programs**
- **Policy and Legal Framework Upgrade**
- **Education and Enforcement**
- **Data Collection and Analysis**
- **Design Standards and Right-of-Way Allocation**

These potential next steps can help shape a well-aligned yet dynamic strategy for addressing emerging mobility in Seattle. Not unlike in other cities, the process to get to a more solidified strategy requires flexibility and willingness for continuous improvement in policy and regulation of emerging mobility.

### 5.3.3.1 Pilot Programs

Pilot programs allow the City to gather data and evaluate the benefits, opportunities, and challenges of any new product or service. They give the City time to test and iterate appropriate regulations, educational efforts, and fees. Pilot programs also send a clear signal to the market that we are open to embracing these new technologies, so long as these emerging mobility services and technologies comply with the City's multi-pronged transportation goals regarding, but not limited to, safety, equity, and sustainability.

- **Partnerships and Collaboration with Commercial Business Operations –**

Working with emerging mobility providers is not only a good idea in this constantly evolving industry, it's a necessity. Emerging mobility services and technologies operating commercially in the City (e.g., shared mobility, delivery, etc.) are anticipated to continue growing and evolving for the foreseeable future. The City, using guiding principles, can and should work with businesses to shape and achieve successful deployment of emerging mobility services and technologies so they meet our goals for equity, affordability, and sustainability. Setting proper expectations and communicating them to the market can better prepare both the City and micro-mobility enterprises to meet common goals and achieve success. This includes protection of the City—its taxpayers—through crafting appropriate indemnification requirements in any pilot or permitted use of emerging mobility in the ROW. Ultimately, if done properly, Seattleites would be, and should be, the main beneficiaries of the deployment of emerging mobility services and technologies.

- **Pilot Program Design** – Pilot programs are an effective means of testing emerging mobility options and should be enacted before launching any large-scale permit program. They provide a means to establish a dialogue with potential vendors who want to commercially operate in the City before devices proliferate.

Based on the results and experiences of Seattle's bike share pilot, other cities' pilot programs, guidelines from the National Association of City Transportation Officials (NACTO), and Transportation for America, any pilot we carry out should include requirements and protocols for:

- Safety and Alignment with Vision Zero
- Equity and Equitable Access
- Communication and Stakeholder Engagement
- Parking
- Data-sharing, Security, and Privacy
- Fees and Revenues
- Collaboration with Service Providers
- Congestion Impacts
- Sustainability
- Labor

SDOT will develop a permit pilot program for shared e-scooter over the next several months. The permit pilot will follow the above recommended requirements and protocols, and pay special attention to crafting insurance and indemnification requirements that meets the City's needs. This may entail, but is not limited to, reviewing in more detail the insurance and indemnification requirements of comparable cities (i.e., San Francisco, Oakland, Los Angeles, and Portland) and coordinating with the City's legal counsel to determine the appropriate level of indemnification.

- **Use Technology and Digital Infrastructure to Regulate Speed Based on Location** – Technology and digital infrastructure exist

that can regulate speeds by location for many shared and commercially operated devices. The best example of this is **geofencing**, which uses the GPS systems installed in the emerging mobility devices to regulate their speeds depending on location. For example, an electric scooter's top speed can be limited in areas without bike lanes or in high traffic areas. By limiting services and speeds by region, dockless devices can be managed to help prevent injuries. There are proposals for geofencing in several jurisdictions, including San Diego and San Jose.

#### 5.3.3.2 Policy and Legal Framework Upgrade

- **Review and upgrade regulations** – Data collection findings can aid in policy development to regulate where new emerging mobility devices can operate and be stored. This includes revisiting existing Seattle Municipal Code and SDOT policies and potentially developing new legislation, possibly at the state level.
- **Refresh City's existing principles** – The City's existing New Mobility Playbook 1.0 (2017) has a good set of base principles. Since 2017, emerging micro-mobility devices, mostly e-scooters and EPAMDs but increasingly delivery robots, are having or will have more and more impact on sidewalks, bike lanes, and streets than was envisioned in the Playbook.
- **Operation and parking** – Clearly define where emerging mobility devices are allowed to operate and where they are allowed to park.
- **Revisit modal priority to inform regulations** – Consider allowing emerging mobility devices to operate in existing bike lanes if they are traveling faster than what would be safe on the sidewalk or walking speed, around 3 mph. Evaluate the effectiveness of basing modal priorities on prevailing safe speeds for sidewalks, bike lanes, and streets.

### 5.3.3.3 Education and Enforcement

Education and enforcement efforts are important to the focus group attendees and are essential to safe operation of any device. Clear guidance on regulations and operations that can be easily communicated are key to a successful campaign. Questions include “how will the rules be communicated?” and “who will enforce the rules?” and “how will they enforce them?”

Education opportunities include:

- **Wayfinding and signage**

- Clear information and signage of what devices may operate in the right-of-way
  - > Physical signage in the ROW
  - > Digital information through streaming, real-time data
- Adapt multi-use “trail courtesy” yield signage for urban sidewalk context

FIGURE 12: A TRAIL COURTESY SIGN COMMONLY DISPLAYED ON MULTI-USE TRAILS



- **Training and education of authorities on the street**

- Seattle Police Department
- Street Ambassadors
- Other partner agencies or organizations

### 5.3.3.4 Data Collection and Analysis

- **Data collection** – Data collection is key to understanding how emerging mobility devices are currently being used around the city, and allow the City to establish baseline usage and inform future policy decisions. SDOT recommends enacting a comprehensive data-collection strategy measuring how, when, where, and for what kind of trips people are using different types of devices. Require data as part of the pilot

- **Commercial services** – Collaborate with service providers to gain insights from the data that they collect. Use data from service providers to better understand deployment needs and modified regulations for specific service areas or districts, ranging from restrictions of use or additional service requirements.
- **Private-vehicles** – Use existing data collection protocols the City uses, e.g., camera studies or public life surveys.

### 5.3.3.5 Design Standards and Right-of-Way Allocation

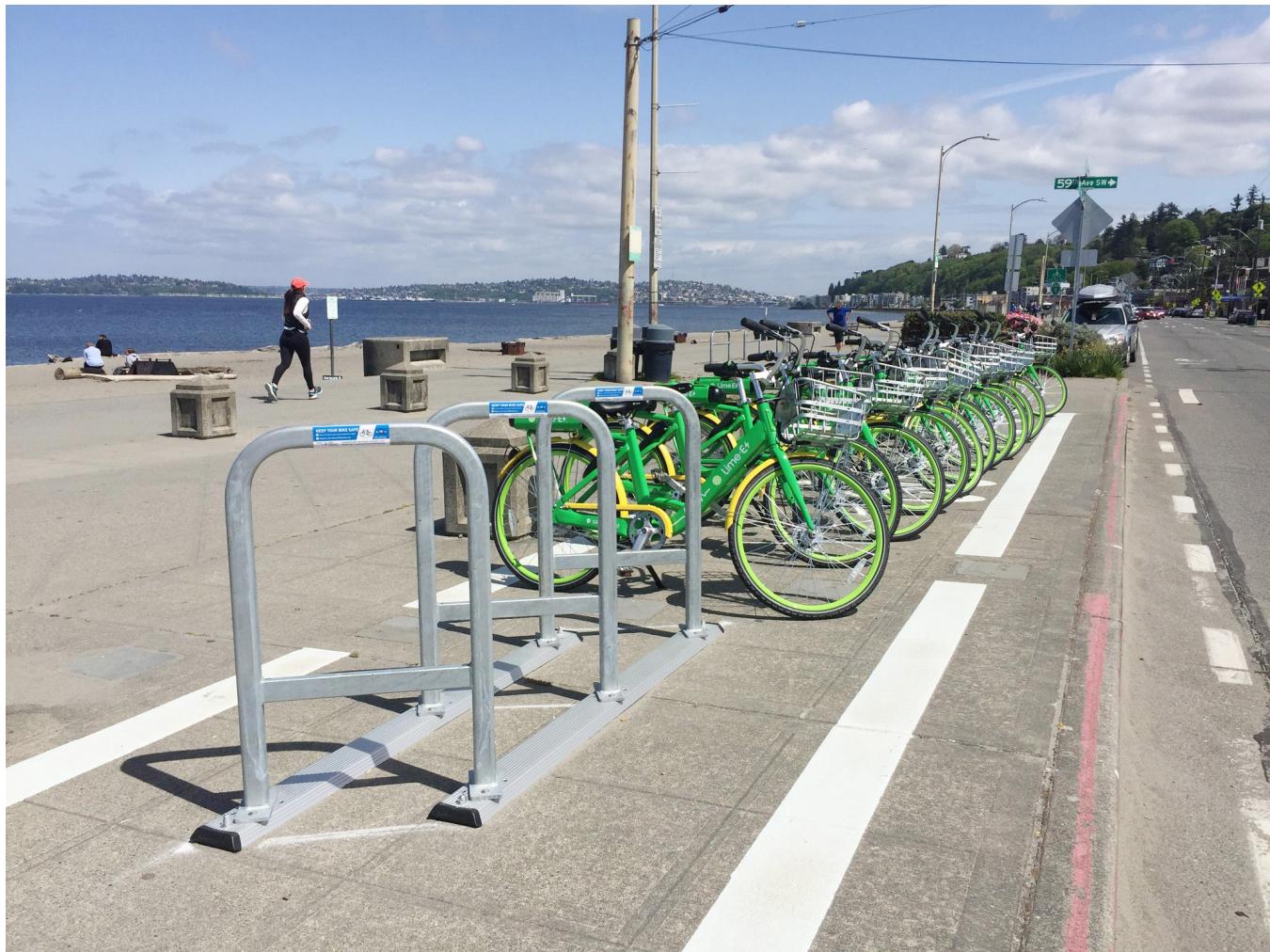
Micro-mobility devices and technologies are currently operated and allowed throughout the city. These include shared bikes and e-bikes. They also include privately-owned devices comprised of e-scooters, e-skateboards, hoverboards, uni-wheels, and other EPAMDs that are also using the right-of-way. The following set of next steps can help clarify implications for the right-of-way, and where and how these devices, including newer devices in the coming years, should be used.

- **Consider designation of low-intensity travel lanes in strategic locations –**

Repurpose a flex-lane or vehicle travel lane (or a portion of it) into a “low-intensity travel” lane or multi-purpose, micro-mobility lane. This could give more room for a variety of devices, from bikes to robots, with little to no impact (if in the street) on the pedestrian clear zone.

- **Integrate emerging mobility devices into street design guidelines** – Evaluate design implications and update SDOT's streets design guidelines (Streets Illustrated) as appropriate, to acknowledge these emerging mobility devices and how they may affect the design of future sidewalks or bike lanes.
- **Manage the sidewalk** – Allow limited use on sidewalks of select devices.
  - Regulating sidewalks to disallow bicycles, scooters, and other emerging mobility devices would be favored by some segments of the population. Pedestrian-priority advocates argue that sidewalks should only be for people walking and for those with disabilities. Disallowing these devices on sidewalks could increase pedestrian comfort and reduce these perceived risks.
  - However, forcing these devices to operate only in the bike lane or roadway does carry some concerns, including:
    - > Introducing a different set of conflicts between these devices, bicycles, and much heavier and faster motor vehicles. This would not only potentially reduce the use of these devices but also increase the chances of death and serious injury for vulnerable users.
    - > Increasing existing inequity in our transportation system. Currently, many neighborhoods with a higher proportion of low-income communities and communities of color lack bicycle lanes. In these areas, riders would thus be required to operate in the roadway—in the same space with cars, trucks, and buses. This could inadvertently make using these devices illegal in these neighborhoods: riders will most likely choose to ride on the sidewalk, where it feels safer to ride.
- > Nationwide studies show that traffic laws are inequitably enforced against people of color. Additional laws and restrictions regulating where these devices can be ridden increase the likelihood of police interactions with people of color and the potential for negative outcomes.
- **Provide marked parking space or zones**
  - Repurpose car parking spaces, especially those close to intersections, into parking for bikes, scooters, and other emerging mobility devices, and/or load zones for delivery devices while enabling pedestrians to be seen. When located close to an intersection, the corrals do not remove legal car parking and also increase pedestrian safety by expanding pedestrian visibility and shortening crossing distances. As part of the bike share program, Seattle is dramatically increasing the number of bike corrals citywide and is pioneering a new design that includes more space for free-floating bikes, cargo bikes, family bikes, and other emerging mobility devices.
  - Provide marked parking spaces in the furnishing zone of the sidewalk. For example, Seattle piloted marked areas for bicycle parking in 2018 and is including larger open space in all new bike corrals to accommodate shared mobility options.

FIGURE 13: A BIKE-PARKING BOX PAINTED ON THE SIDEWALK IN SEATTLE.



Source: SDOT

# APPENDIX A – SURVEY OF CITIES

Similar to what Seattle has done with its bike-share pilot program, most cities also have conducted or are conducting pilots for various emerging transportation technologies, from shared mobility to personal delivery robots.

Regulation of private and personal mobility devices, however, have been somewhat limited to existing rules and regulations for similar devices, like Segways and skateboards. For Seattle, clearer regulation of these personal mobility devices would enable better management of the right-of-way, and overall, a safer experience for all using the sidewalk, bike lane, or street.

This section summarizes the findings from the survey of notable comparable cities and how they are addressing emerging transportation technologies in the right-of-way.

Cities across the country have embraced, managed, and regulated these emerging technologies in different ways. For this report, we've categorized notable comparable cities into four geographies:

- Washington State cities
- West Coast cities
- Other U.S. cities
- International cities

## WASHINGTON STATE CITIES

### Tacoma

Starting in late 2018, the City of Tacoma allowed dockless bike and e-scooter share to operate via a 60-day permit. Two vendors took part in the pilot program which included e-bikes and e-scooters. After the pilot only one vendor extended their permit to late 2019 and only included e-scooters. The permit outlines per

vehicle fees, data sharing, fleet size, benchmarks, survey requirements, and other additional details.

In Tacoma, e-bikes are allowed in bike lanes, and anywhere bicycles are allowed (including sidewalks). In contrast, e-scooters can operate on roadways, shoulders, sidewalks, and alleys, but not on bicycle lanes, pedestrian paths, park trails, or school fields or playgrounds. Helmets are required to operate either vehicle.

### Spokane

The City of Spokane is developing a Shared Mobility program that will make available rental bikes and scooters throughout the city. The City of Spokane established a pilot program to trial dockless e-scooters, e-assist bikes, and regular bikes for a 74-day period in 2018. Afterward, the city commissioned a report to analyze the findings. The report found that the majority of trips taken were on e-scooters, and most users used the sidewalk.

The City is preparing to allow shared mobility to become a more permanent program. In order to do so, the municipal code has been updated, operational permit requirements are under development, and a request for proposals has been issued to shared mobility operators who have expressed interest to work in Spokane.

The City Council recently approved ordinance amendments that:

- Allow application-based rental programs to promote helmet use through education, advertisement, and/or reduced fares instead of the requirement to directly provide a helmet with every rental transaction.

- Allow motorized scooters to operate downtown but restrict them from sidewalk use. Adjustments to roadway use requirements will allow motorized scooters to operate in the downtown roadways and bicycle lanes.
- Allow motorized scooter users to wear a bicycle helmet, as opposed to the former requirement to use motorcycle helmets.

In addition, the city has asked companies that provide e-bikes and e-scooters through apps to automatically slow the vehicles down from their maximum speeds in certain areas of the city, such as Riverfront Park.

## WEST COAST CITIES

### Vancouver, BC

Two bike share services operate in metropolitan Vancouver, British Columbia. The City of Vancouver's public bike share system, Mobi by Shaw Go, launched in summer of 2016. It's a station-to-station ("docking station") type system with services focused in the city of Vancouver. A second operator, U-Bicycle, is a free-floating system focusing its service in three neighboring municipalities.

E-scooters are not yet allowed in Vancouver. Due to laws that vary widely between provinces, and different transportation options already available in Canadian cities, different types of devices may be ideal for these cities. For example, rentals of Vespa motorized scooters (essentially mopeds) are already common in BC. E-bikes and e-scooters don't offer as much of an exciting new alternative as they do in US cities. When micro-mobility companies arrive in Canada, they may offer vehicles more like the Veemo – an enclosed, electric-assist tricycle – to attract a new audience or market. "Veemos" are being tested on the University of British Columbia campus.

### Portland, Oregon

In 2018, from July to November, the city conducted an e-scooter pilot to collect data and get a better sense of the challenges and potential

benefits of these devices. The e-scooter pilot was intended to give Portlanders access to a new transportation option while also testing this device's ability to support the city's transportation policies and values. The pilot set a framework for e-scooter companies to align their business with four major city objectives: 1) reduce traffic congestion by shifting trips away from private motor vehicle use, 2) prevent fatalities and serious injuries on city streets, 3) expand access to opportunities to underserved Portlanders, 4) reduce air pollution, including climate pollution.

With regard to insurance requirements and indemnification, the e-scooter pilot permit application required applicants to have a minimum of \$1 million of general liability per occurrence and \$2 million in aggregate for covered claims related to bodily injury and property damage. The indemnity clause in the permit application states, "The Permittee shall agree to indemnify, defend, and hold the City of Portland and its elected officials, officers, employees, and agents harmless from and against all claims arising from, in whole or in part, the Permittee's operations under its permit."

The city released its e-scooter findings report in January 2019. The report highlights that over 700,000 trips were taken during the pilot, covering over 800,000 miles, on a fleet of about 2,000 scooters. The report generally concludes that e-scooters have the potential to help advance the city's transportation goals, but with some challenges to still overcome. Some of the perceived challenges include: while e-scooter-related injuries occurred, most did not warrant emergency transport; high number of public complaints of e-scooters on sidewalks and improper parking impacting safety and comfort of people walking or people with disabilities; effect on reduction of air-pollution not yet clear, need more data; and operators' compliance with permit requirements was mixed.

Generally, the positive outcomes of the pilot outweighed the negative impacts. Given that, the city's transportation department recommended a second pilot, starting in spring 2019, to be carried out for one year. To help overcome the challenges, the city is working with community members to gather input to improve the permit requirements and how to better administer the next e-scooter pilot. The city's transportation department anticipates that this second trial run would give the city more time to collect data and figure out ways to better address the issues and challenges observed in these pilots.

Additionally, the city's transportation department is carrying out more opportunities for the community to learn about the proper use of these new mobility devices in the right-of-way.

The following rules apply to e-scooters in Portland.

#### Oregon state vehicle code:

- **No sidewalk riding** – Using an electric scooter on the sidewalk and in crosswalks is prohibited. People using electric scooters are allowed on Portland city streets, multi-use paths and in bike lanes.
- **Helmets are required** – People using electric scooters are required to wear a helmet.
- **Minimum age** – Youth under age 16 are prohibited from riding electric scooters.
- **Yield to pedestrians** – People using an electric scooter are required to yield to pedestrians.

#### City code:

- **No riding in Portland Parks.** Motorized wheeled devices are prohibited in Parks, except on Park roads, or in designated vehicle parking areas, or by permit. Multi-use Paths in Portland Parks include: Waterfront River Trail, Eastbank Esplanade, Springwater Corridor.

FIGURE A-1: INSTRUCTIONS FROM PORTLAND'S EDUCATION CAMPAIGN ON HOW THE CITY E-SCOUTS



Source: Portland Bureau of Transportation

## San Francisco

The San Francisco County Transportation Authority (SFCTA) has a dedicated program for emerging mobility. Their work includes a detailed inventory of different service and technology types that comprise emerging mobility and a set of 10 guiding principles. The program has also recently produced an evaluation report and a pilot strategy for emerging mobility.

Some initial findings from their work (directly from SFCTA):

- **Pilots and permits lead to better performance**

Companies that have performed pilots with San Francisco public agencies have provided data and experience that has informed development of permit systems for those mobility types. The resulting permit systems for bike share, scooter share, and micro-transit have guided these mobility types to be more aligned with the 10 Guiding Principles. There are opportunities to strengthen and harmonize the various permit programs. In addition, the City does not yet have a standardized process to proactively conduct pilots and incorporate innovative service types and new companies into the city's permitting and planning systems.

- **Inadequate data**

The City does not have adequate data from enough emerging mobility companies to fully evaluate how well emerging mobility services are aligned with our Guiding Principles. Other researchers have produced important studies and findings about some emerging mobility services, but more traveler trip data and surveys are needed to characterize SF travel markets and individual traveler choices.

- **Opportunities for equitable access**

Many emerging mobility services are available during late-night hours, on weekends, and/or in areas less well covered by public transit. This may provide opportunities to increase mobility for people with disabilities and increase access for people underserved by public transit.

- **Conflicts with public transit**

San Francisco is a Transit-First city, but inadequate data means the City does not have comprehensive information on how the emerging mobility sector is impacting transit ridership or our capital investments. While some services play a useful first/last-mile connection role, no emerging mobility companies have implemented design features or policies that our methodology identified as directly supportive of transit.

- **Impacts on safety**

With the exception of micro-transit providers, operator training is inconsistent among emerging mobility services; almost no providers test operators following training. As a consequence, many services may exhibit roadway conflicts at curbs, in transit-priority lanes and on sidewalks—all of which may have significant impacts, particularly on vulnerable roadways users. Additionally, many emerging mobility services may contribute to distracted driving, which also decreases roadway safety.

- **Impacts on congestion**

Because the City has inadequate data, it does not fully understand how this sector is impacting travel mode choice behavior and congestion. The City does know that many emerging mobility services rely on city rights-of-way and curbs. The City and the emerging mobility companies have not consistently coordinated to develop a robust curb management approach. Other researchers have found mixed impacts. For ride-hailing in particular, SFCTA's own "TNCs Today" study found that ride-hail vehicles in San Francisco are concentrated during times of day and neighborhoods of the city where traffic is most congested. A UC Davis study found that adoption of ride-hailing is likely to result in a net increase in vehicle miles traveled due to competition with public transit. Other studies have found that users of other mobility services chose to drive personal vehicles less frequently.

Some recommendations based on their evaluation:

- **Partner: Proactively Partner**

The San Francisco Metropolitan Transit Authority (SFMTA) and the County Transportation Authority should develop a framework for emerging mobility pilots that considers this study's evaluation results and encourages the city to proactively partner with companies to develop innovative solutions to address unmet city transportation needs. This framework should consider partnerships with transportation companies, employers, developers, and civic and neighborhood organizations.

- **Measure: Collect Emerging Mobility Data and Conduct Research**

San Francisco public agencies should develop a data reporting and warehouse strategy to coordinate and consolidate existing data streams. Additionally, the city should employ a travel decision study to understand travel behavior. Such a study could be combined with a mobile application pilot that studies traveler choices and factors that inform them.

- **Regulate: Regulate and Recover Costs**

The SFMTA should harmonize existing permit programs related to emerging mobility and create a framework for new services. The emerging mobility permit program should administer a permit fee that considers the full cost to plan for and regulate these services. Similarly, the city should seek regulatory and/or impact fees to mitigate effects these services have on safety, city resources and investments, as warranted by research studies. The permit must also require a standard set of data necessary to conduct ongoing evaluation of these services and include standards for equitable provision of services to underserved areas and to people with disabilities.

- **Bridge: Bridge Mobility and Access Gaps**

The city should develop a user study to more clearly understand who uses emerging mobility services and for what purposes. This study should focus on equity gaps for low-income users and issues related to disabled access. The SFMTA and the Transportation Authority should also develop pilots to fill mobility and access gaps, such as for paratransit, late night transportation, school-related transportation, and in areas less well-covered by public transit.

- **Prioritize: Support and Prioritize Public Transit**

The Transportation Authority and the SFMTA should continue to support the expansion of transit-priority facilities. The Transportation Authority and the SFMTA should collaborate in developing a series of studies related to rights-of-way prioritization, vehicle miles traveled, financial impacts, and cost-recovery. To support these studies, the Transportation Authority and the SFMTA should conduct pilot programs that improve first and last mile connectivity to transit stations.

- **Enforce: Enforce Safe Streets**

The SFMTA and the Police Department should increase enforcement of known emerging mobility conflict areas throughout the city and consider piloting enforcement blitzes to encourage safe operation. Similarly, they should seek legislative authority and implement a pilot that automates enforcement to promote safety, ensure more systematic adherence to traffic rules, and reduce enforcement costs. The SFMTA should also develop a Vision Zero study that studies collision rate trends and unsafe operations, determines whether there is a correlation with emerging mobility services, and identifies recommendations to reduce traffic fatalities.

- **Price: Manage Congestion at Curbs and on City Roadways**

The SFMTA and the Transportation Authority should prioritize developing a curb management strategy that allocates and prices curb access appropriately. Such a strategy should be supported by curb management pilots with emerging mobility services and through a curb management prioritization study. The SFMTA should also develop and implement an emerging mobility streets design guide to reduce modal conflicts. Finally, based on current congestion levels on San Francisco roadways, San Francisco should move toward implementing a decongestion pricing and incentives system, whether through cordons or roadway user fees, to manage roadway congestion.

San Francisco, like many cities across the United States, became a showcase for unmanaged micro-mobility in early 2018. Several scooter-share companies arrived unannounced and quickly off-loaded thousands of rental scooters. The city felt overwhelmed with new and poorly understood safety hazards and sidewalk clutter. City leaders quickly banned the e-scooters, but within several months established a pilot program to test these devices in a more controlled fashion. By mid-year, San Francisco selected two (out of twelve) companies that had applied for a pilot permit, and e-scooters were back on the streets, although in much smaller numbers. The pilots will be completed in late spring 2019, when City leaders will review the results and determine next steps.

In the pilot permit application, indemnification and insurance requirements are generally stated. Similar to indemnity clauses in other cities, San Francisco's clause generally states that the "Permittee shall indemnify and save harmless City and its officers, agents, and employees from... any and all loss, cost, damage, injury, liability, and claims..." from e-scooter use as authorized by the permit, "...except where such loss ... is the result of the gross negligence or

willful misconduct of the City..." The permit application requires general commercial liability with limit no less than \$2 million for each occurrence and \$4 million in aggregate. The permit also requires commercial automobile liability insurance, professional liability insurance, and cyber and privacy insurance.

To address the proliferation of e-scooters in California, some state laws were amended or updated to clarify rules governing motorized scooters. These new rules are effective as of January 1, 2019. Notable rule clarifications include:

- Helmet laws for motorized scooter:
  - If under age 18, the e-scooter rider is required to wear a helmet.
  - For ages 18 or older, helmets are optional.
- Riding on sidewalks is not permitted.
- E-scooters should be ridden in bike lanes, unless specified otherwise by a local authority.
- General speed limit for e-scooter is 15 mph.
- E-scooter rider must have a valid (automobile) driver's license or instruction permit.

While the pilot program and new legislation does not explicitly address other types of micro-mobility, it sets a precedent for potential other devices.

In December 2017, the Board of Supervisors passed Ordinance 244-17 amending the Public Works Code (Section 794) to allow Autonomous Delivery Device (ADD) to operate on City sidewalks for research and development testing. In coordination with other City agencies, Public Works oversees the program and issues permits authorizing the operation of the devices on City sidewalks.

## Oakland

Oakland offers a bike share program, launched in July 2017, and currently permits e-scooters to operate in the city.

The city prepared the “Dockless Scooter Share Program Terms and Conditions + Permit Application” document, most recently updated in May 2019.

Of note, the City’s indemnification clause is somewhat more stringent compared to San Francisco’s. The indemnification clause more clearly states that e-scooter permittees agree to indemnify the City from liability and risk arising from potentially dangerous conditions of the right-of-way. The clause states that the e-scooter provider, by accepting the permit to operate in the City, agrees “...to defend, indemnify, and hold harmless City and each of its respective Councilmembers, officers, directors, partners, agents, and employees ... from and against any and all liabilities, claims, lawsuits, actions or causes of action, losses ... or for damage or destruction of any property of either party hereto or of third parties, in any manner resulting from, arising out of, relating to, or by reason of any ... act error, or omission, including both passive and active negligent conduct, of City and/or Indemnitees, including without limitation, any act or omission resulting from, arising out of, or relating to the design, construction, maintenance, repair, replacement, oversight, management, or supervision of any physical, environmental, or dangerous condition(s) of the Public Rights-of-Way and of any related improvements, or with respect to the suitability of the Public Rights-of-Way for Operator’s and/or its Dockless Scooter Share Users’ or Customers’ intended use.”

As the City continues to refine its rules, regulations, and permit process, e-scooters are still allowed to operate in the city. The initial permits issued to operate e-scooter share services are valid for one-year, and operators must renew year-by-year. The next round of permits will be issued to selected applicants beginning in June 2019.

In Oakland, as in San Francisco, state laws generally govern motorized scooters. They are prohibited on sidewalks. E-scooters may be ridden on the street, a bike lane, and multi-use paths. They may be parked on sidewalks—in the “furniture zone”—so long as they do not block driveways, building entrances, curb ramps, color curbs (such as blue zones or yellow zones) or utilities such as fire hydrants. They may not block space for people walking or rolling. To operate, riders must have an (automobile) driver’s license or instruction permit. As of January 1, 2019, helmets are optional for riders ages 18 and over, but riders under the age of 18 are still required to wear a helmet.

## Los Angeles

Shared micro-mobility devices have been available in Los Angeles since late 2017, but they entered the market more gradually and with much less drama compared to San Francisco. Two council districts hosted pilot projects in 2018 to assess the impacts of the devices, but other devices weren’t banned while the pilots were underway. Users are only limited by the service areas of the rental companies. Today various parts of LA host a wide variety of pedal-bikes, e-bikes, and scooters.

Since rentals have been largely unregulated in LA, it provides an interesting case study for injury rates. Researchers found that 250 people have arrived in emergency rooms within a year, and 3 have died in scooter crashes. Critics use this data to spotlight the hazards, pointing out that these numbers will grow further if scooter use becomes more widespread. Proponents note that this number of crashes is still small compared to overall crashes (i.e. thousands of crashes in the same timeframe for cars and pedestrians). Without good data on the number of miles traveled on scooters, it’s impossible to tell if scooters are really a more dangerous way to travel compared to other established modes.

Per Los Angeles city code, scooters are essentially regulated as motorcycles and are therefore banned from trails, sidewalks, etc. However, these laws seem to be largely unenforced with the recent rise of small electric scooters.

## Santa Monica

Santa Monica started a 16-month Shared Mobility Pilot Program in September 2018. The pilot allows four companies (Bird, Jump, Lime, and Lyft) to provide shared mobility services—shared bike and scooter services—in the public-right-of-way. The pilot aims to:

- Develop a new area of policy, regulation, and enforcement through firsthand experience
- Move quickly to adapt to a rapidly changing industry, but leave room to learn and adjust as appropriate
- Test new device and service providers in a growing industry
- Explore partnership models with private companies
- Explore possibilities for data capture, structures, and utilization

- Allow the City time to experiment with different management tools like “Geo-fencing” and creation of shared mobility device drop zones

The city’s administrative rules are subject to change during the pilot. The city continues to work with the companies to make data-driven decisions to deliver safe transportation options. And find effective solutions to known and identified challenges during the process.

Per city rules, bikes/e-bikes, and e-scooters may not be ridden on sidewalks or specific pathways. Devices must be ridden in bike lanes. As of January 2019, helmets are required to operate e-scooters for those under the age of 18. In Santa Monica, these rules are strictly enforced and violators ticketed.

To manage parking clutter, the city has installed marked “drop zones.” They include both marked parking areas on the sidewalk and in-street parking corrals. Illegally parked devices may be impounded and charged \$95 per device assessed to the operator to retrieve the device.

FIGURE A-2: DESIGNATED PARKING FOR MICRO-MOBILITY IN SANTA MONICA



Image from: <https://la.streetsblog.org/2018/11/08/santa-monica-installs-in-street-e-scooter-parking-corrals/>, by Gary Kavanaugh

## San Diego

San Diego released draft regulations governing the dockless bikes and scooters in February 2019. The city took some time to develop rules that could work for the city, the community, and micro-mobility operators. The document regulates:

- **Speed** – Companies would be required to restrict vehicle speeds using geofencing technology in designated zones to 8 miles an hour, down from the current 15 miles an hour. In high-pedestrian areas, devices will be automatically slowed to just 2 miles an hour, with riders receiving alerts that these areas are “no-ride zones.”
- **Parking** – Riders will be prevented from ending rides in certain high-traffic areas, including on the boardwalks, around the stadium and waterfront.

Companies will also be restricted in where they can set up the vehicles. The devices must be staged in groups of no more than four and at least 40 feet apart.

The devices cannot be parked within 500 feet of K-12 public schools or hospitals, or within six feet of bus and trolley stops.

- Residents would be encouraged to report improperly parked or abandoned vehicles using the city’s “Get it Done” app. Dockless scooter and bike companies will be notified as a result and given three hours to move a device or face impound and other fees.
- **Fees** – Companies would be required to obtain operating permits every six months in January and June, which declare and fix the size of each vehicle fleet. Companies would have to pay associated fees to be established by the City Council. The mayor has proposed \$253 a permit and up to \$150 per device annually.

- **Education** – Motorized scooters must be labeled in 40-point font that “Riding on Sidewalks is Prohibited,” as well as any age requirements adopted by the operator.
- **Data** – Operators would be required to share data on fleet sizes, how often devices are used, trips and parking locations, accidents and maintenance.

## OTHER U.S. CITIES

### Atlanta

The city has codified administrative rules on shareable dockless mobility devices that include e-bikes and e-scooters. By permit, Atlanta allows shared and dockless e-bike and shared e-scooters services to operate in the city. The devices are not allowed on sidewalks or spaces designated exclusively for pedestrian use. They are allowed on pathways in city parks, including the Atlanta BeltLine. The city’s administrative rules outline requirements for permit application, enforcement, safety, parking, operations, data sharing, and equity. Violations of rules can incur fees of up to \$1,000 per day.

### Austin

In August 2017, the Austin city council passed a resolution to allow testing of personal delivery devices in the city. According to the resolution, “no fees or exchange of monetary services are anticipated as part of the pilot.” Operators must obey the city’s operational and geographic restrictions. To address equity and access issues, the resolution encourages companies to deploy devices in traditionally underserved areas. Devices cannot exceed weight of 300 pounds excluding cargo (similar to specifications for motorized wheelchairs) and cannot exceed a maximum speed of 10 miles per hour.

The personal delivery devices are allowed only on city sidewalks, crosswalks, and other pedestrian paths. The resolution also requires operating companies to maintain at least \$1 million in liability insurance. Devices should also be marked with information to allow the public to submit

inquiries or comments. Results from the pilot are not yet published, but a report from the city manager to the city council is anticipated in August 2019.

In April 2018, while the city was engaging with the community on how to regulate e-scooters, companies began deploying e-scooters throughout the city in April 2018. With little to no regulation, e-scooters quickly proliferated. By summer 2018, the city crafted an initial set of rules to manage these new devices. The city now hosts approximately 17,000 of them.

Regulation for e-scooters is relatively moderate, with lawmakers providing “common sense” rules or guidance: regulations like one rider at a time, wear a helmet, and don’t ride intoxicated. Scooters and similar devices are allowed in bike lanes so long as they do not exceed 20 mph and in vehicle lanes, if the speed limit for that road is less than 35 mph. They are also allowed to be ridden on sidewalks except for specific streets in the downtown area. A few parks and pedestrian plazas with high-pedestrian traffic ban scooters altogether.

While Austin has embraced these devices for mobility, parking them has created a fair number of issues, not unlike in other cities. Due to a lack of parking space on sidewalks, scooters have often piled up in popular areas.

In January 2019, Austin set a moratorium on issuing new licenses for dockless mobility. While they don’t seek to regulate scooters, or reduce their numbers, they do plan to stop the rapid proliferation and look for opportunities to increase safety and more effectively manage parking and overall operations of these devices.

Austin also hosts a variety of docked and dockless bike share options. Per city code, bikes are allowed on the sidewalk except for specific streets, and bikes can be parked on a sidewalk if they’re against a curb or building (or within a bike rack).

## **Chicago**

Chicago allows a station-based shared bike operation. The city conducted a free-floating bike share pilot between May and November 2018 for the Far South Side of the city. The city is in the process of evaluating the data. Bikes are only allowed on the sidewalk if such sidewalk has been officially designated and marked as a bike route. The city prohibits bikes on sidewalks for specific, high traffic streets.

The city is aiming to launch an e-scooter pilot in 2019. A report by the city’s mobility and transportation task force recommended the city should incorporate and regulate these new forms of mobility, from e-scooters to autonomous vehicles. However, with the rapid growth in micro-mobility options and potential impacts to people on sidewalks, the task force also recommends updating the City’s Municipal Code to expand micro-mobility devices that can utilize bike lanes. And the city should develop clear policies around right-of-way placement and use of micro-mobility devices in the public right-of-way. These policies will help to ensure shared bikes, scooters and other dockless mobility devices are not an impediment to access of the public way.

## **Denver**

The city currently allows a station-based bike share system, that started operations in 2010. Free-floating bike share began operations irregularly in 2018.

In late May 2018, several e-scooter companies started operations in the city absent any regulations for these devices. Within a few days, the city’s public works department ordered the companies to suspend operations until rules could be agreed to regulate dockless e-scooters and bicycles. By the end of July 2018, the city allowed the relaunch of dockless e-scooters and bikes/e-bikes through the Transit Amenity Program, Dockless Mobility Vehicle Pilot Permit Program. The pilot program is expected to run for one-year, through August 2019.

In January 2019, the city council passed an ordinance requiring e-scooters to be ridden in bike lanes or on roads where the speed limit is 30 mph or less. Where there is no bike lane and the speed limit is higher than 30 mph, e-scooters may be ridden on adjacent sidewalk.

The City and County of Denver in partnership with the Regional Transit District are also currently undertaking a separate and different pilot project—61AV—that allows a driverless “transit pod” to circulate on a fixed route to connect a commuter transit station to nearby employment offices.

## New York City

The city allows a station-based bike share, in operation since 2013. The city launched a free-floating (“dockless”) bike share pilot July 2018. In November 2018, the city extended the pilot for another 90-days to gather more data for evaluation. Bikes are not allowed on sidewalks.

E-scooters are currently not legal to operate in New York City, per New York state law. The city currently revisiting their bans on motorized scooters and trying to negotiate how to integrate e-bikes more effectively.

## Washington, DC

The city initially approved a one-year pilot for personal delivery devices in September 2016. The city extended the program through end of 2018. One company, Starship Technologies, participated in the pilot. Per program rules, the company could operate no more than 5 devices at a time. Delivery robots can operate on sidewalks and crosswalks except within the Central Business District. Some of the operating rules for delivery robots: 1) operate in a safe and non-hazardous manner so as not to endanger pedestrians, bicyclists, other users of public space, or property; 2) not operate above 10 miles per hour; 3) have a gross weight of less than 50 pounds, excluding cargo; 4) not interfere with pedestrian or bicycle traffic; 5) yield the right-of-way to all vehicles approaching on a roadway upon entering a crosswalk to the extent necessary to

safely cross the roadway, except when crossing pursuant to a crosswalk pedestrian signal; 6) have a system that alerts the operator if a technology failure or loss of communication occurs; 7) obey all traffic and pedestrian control signals and signs.

The city has yet to publish a report on the pilot’s findings.

Starship Technologies reported to the city’s transportation department that three collisions occurred during operations, all involving a motor vehicle running into the delivery robot. The company noted that in each case, the device had the right-of-way, and the motor vehicle operator failed to yield.

Since June 2017, delivery robots in D.C. have made more than 6,500 trips, traveling at a little over 2 mph, and average delivery distance about 1.5 miles.

Shared bike rentals, both station-based and free-floating operations, are allowed in the city. The station-based system, SmartBike DC, was the first in a large city to launch in the United States. It began operations in 2008 with 10 stations and 120 bicycles. A subsequent version, Capital Bikeshare, started operations in 2010 with 49 stations and 400 bicycles. More recently, in September 2017, the city launched a pilot for both free-floating bikes and e-scooters. The city has extended its pilot through December 2019. Currently, one company operates a dockless bike system in the city. Five companies currently operate e-scooters.

Bikes are allowed on sidewalks but cannot create a hazard or ride in certain areas (Central Business District). They also need to ride under 10 mph and cannot suddenly leave the sidewalk and impede traffic.

But e-bikes may not be ridden on sidewalks.

E-scooters may be ridden on sidewalks except in the Central Business District.

D.C.'s latest permits require that any dockless bikes be equipped with locking mechanisms so riders can affix them to posts or bike racks.

## INTERNATIONAL CITIES

### London

In the United Kingdom, the Department for Transport (DfT) classifies e-scooters as Personal Light Electric Vehicles (PLEV), along with hoverboards, electric skateboards and twist-throttle electric bikes and are not allowed on public roads or sidewalks; they can be used on private property. Pedal-assisted electric bikes are allowed, however, so long as they are capped at 15 mph. One e-scooter company, Bird, operated a brief pilot in Queen Elizabeth Olympic Park, as it is technically private property.

In **Greenwich**, a township in the London greater area, Starship Technologies is started a 6-month pilot for self-driving delivery robots in March 2019. The town is partnering with the company to test the delivery robots; Starship Technologies located its UK base in Greenwich. The company chose the UK because of the government's clear commitment to autonomous and semi-autonomous vehicles. In Greenwich, the company is operating a small fleet of 10-15 robots, delivering mostly take-out food orders, but more and more parcel, of up to two miles.

In **Milton Keynes**, about 50 miles northwest outside of London, Starship Technologies started testing hundreds of delivery robots in late 2018. It is the first full-scale use of the technology. Starship chose Milton Keynes as its test bed because the city's modern road and pavement infrastructure; more robot friendly. And the city was quite welcoming of the technology; the city is an emerging technology/smart city in the UK.

More about the delivery robots:

- Travel along pavements and cross streets, just like pedestrians
- Have 10 cameras, ultrasound sensors, radar, and GPS
- Can see 360 degrees and have a "situational awareness bubble" around them to detect and avoid any obstacles
- Use sophisticated computer vision and software to identify objects such as cars, pedestrians, traffic lights and pavements

### Paris

E-scooters debuted in Paris in summer 2018 with little regulation. While it struggled in London, one firm reported that 50,000 people had taken an e-scooter ride, covering over 250,000 miles, two months into operations in Paris. For some months, the regulations had been murky. Recently, in March 2019, Paris mayor Anne Hidalgo launched campaign to disallow scooters on sidewalks—"footpaths are for pedestrians only!" Scooters must now be ridden to roads and bike lanes. Violators riding on sidewalks (footpaths) will be fined €90 (about \$101), which rises to €135 (about \$151) if not paid within two weeks. Parking will be addressed with multi-pronged approach. The city will designate appropriate parking locations for micro-mobility devices by summer 2019 and any illegally parked scooters will be impounded with a €35 (about \$39) recovery fee. Companies encourage riders to wear a helmet, but there is no legal requirement.

### Singapore

In Singapore, the use of e-scooters and other similar electric personal mobility devices (PMDs) is governed by the Active Mobility Act (ACA). Singapore allows e-scooters and other PMDs on shared paths, or bike lanes, but not on designated pedestrian-only paths. They are also allowed on footpaths, which do not have specific signage. Footpaths are public paths that are not pedestrian-only paths, shared paths, or roads. Penalties for riding in the wrong place can range from \$1,000 - \$2,000 and/or 3 month in jail. Also, only approved models allowed. As of January

2019, devices must be registered, licensed, with the Land Transport Authority (LTA). As of February 2019, the city has limited speeds to 10 km/h (about 6 mph) on footpaths and 25 km/h (about 15 mph) on shared paths. Penalties can reach up to \$5,000 and/or jailed up to 6 months for riding exceeding the speed limit or riding dangerously. E-scooters may be brought onto public transport but must be in its folded position.

## **Mexico City**

In April 2018, a startup began operating e-scooter share in the city. Starting with only 15 scooters, primarily in trendy neighborhoods, the number grow to over 200 scooters by early 2019. In February 2019, the city revoked the company's permit for failing to submit information about its operations to the government's Secretariat of Transport (Semovi). But months of protests, a fatal accident, and pressure from neighbors may have had impact on the decision. In late March 2019, Semovi published regulations for "Sustainable Individual Transportation Systems" (SiTIS). The rules govern authorized service providers to operate in designated areas of the city. The regulations also specify where and where not to park bikes or scooters. The new set of rules also frame other operating obligations, from safety features required on devices, devices restricting speed, to fleet size caps, pricing/fees, and insurance policies.

## **Munich**

Munich offers an innovative approach to education and outreach about the broad range of mobility options. A new residential development closely located to a tram line includes a mobility hub, a "living lab" for mobility solutions. The hub includes e-bikes, e-scooters, cargo bikes, and electric car share for use by residents and the general public. Munich also provides a mobility center where residents can get assistance on a walk-in basis, and where the city offers training tailored to particular groups, such as seniors and recent immigrants, on how to use the mobility options.

# APPENDIX B – SUMMARY OF COMMUNITY FOCUS GROUP

On March 26, 2019, SDOT staff hosted a community focus group on managing emerging mobility technologies in the right-of-way. The following groups were invited to attend: Pedestrian Advisory Board, Bicycle Advisory Board, Transit Advisory Board, Freight Advisory Board, Planning Commission, the Commission for People with disAbilities, Disability Rights Washington, National Federation for the Blind, Cascade Bicycle Club/Washington Bikes, and Seattle Neighborhood Greenways. Current permitted bike share companies (Jump, Lime, and Lyft) were also invited to attend in a listen-only capacity. A list of who participated in the focus group is provided at the end of the summary.

After a brief presentation about the Statement of Legislative Intent and an overview of the different types of emerging mobility devices, we facilitated an exercise and discussion. The following is a summary of responses from the focus group:

## WHAT ARE THE BENEFITS AND OPPORTUNITIES?

- **Environmental** – Potential for helping to reduce pollution, carbon emissions.
- **Safety** – Potential for reducing car use, SOV travel. With fewer cars, less traffic and increase in overall safety.
- **Equity** – More options for travel for all ages. Equity in travel options; not everyone has a driver's license, i.e., youth and others not able to drive.
- **Health** – Encourages healthy and active travel options.

- **Transit Integration** – First-and-last mile solutions; can improve access to transit.
- **ROW Rethink** – Opportunity to rethink allocation of ROW space for safer movement and staying uses for all users—from people walking, to bikes and “light mobility devices,” to cars and trucks, to cafes and people just using the sidewalk as public space.

## WHAT ARE THE CHALLENGES AND DRAWBACKS?

- **Limited Space in ROW** – Not much dedicated space for all these new devices.
- **Safety** – Not enough room on sidewalks; concern over conflicts on already crowded sidewalks.
- **Speed** – Higher speeds of some of these devices incompatible with slow sidewalk speed.
- **Conflicts with people with disabilities** – Potential for a lot of conflicts and challenges on sidewalks with people who have disabilities, are blind, or are elderly; devices would limit safe access on sidewalks for people who are disabled or differently-abled; quiet and/or small devices are difficult for people with low vision or low hearing to detect.
- **Parking issues** – Improperly or poorly parked devices block the sidewalk pathway; devices easily fall over; they create clutter in the public realm.

- **Holistic ROW reimagination** – Not enough space to accommodate all these new uses at the edge of the ROW, thus all the other problems above about safe flow, parking issues, and clutter. Too much room dedicated to cars. If these micro-mobility devices are to succeed—become a safe addition to the transportation system—the City needs to dedicate space for them. We (the people) are fighting over the leftover edge space to fit in biking, walking, cafes, these new devices, parking them, etc. Just not enough room!

## WHERE SHOULD THESE EMERGING TECHNOLOGIES OPERATE?

- **Not on sidewalks!** – Some say not on sidewalks at all. Should be sacred space for people who are walking and people who are differently-abled. Safety for pedestrian users should be a priority on sidewalks. Can't ask peds to give up more space—40% of city doesn't have sidewalks, so these devices would need to have provision to use roadway in these areas.
- **Sidewalks okay, maybe? If street not safe?** – Others responded that without safe bike lanes, forcing people into mixed traffic is not a good solution. They pointed out the fact that most people die on the streets because of cars, not devices on the sidewalk.
- **Bike lanes** – Turn bike lanes into “low intensity travel” or multi-modal “go” lanes to accommodate bikes and a select set of these micro-mobility devices.
- **ROW rethink** – Modify and reallocate the ROW to have truly dedicated space for these new devices.
- **Regulate by speed of device** – Faster speeds should not be on sidewalks but in bike lanes or automobile lanes. Slower speeds, less than 4 mph, should be considered allowable on sidewalks.

## HOW SHOULD THE CITY MANAGE EMERGING TECHNOLOGIES IN THE RIGHT-OF-WAY?

- **Highest priority should be safety for all users** – Thus need to consider reallocation of ROW to allow for all users to have enough room to be safe
- **Rethink paradigm of ROW being primarily for cars** – ROW more than just mobility. City needs to manage for wide range of uses in the ROW Safe travel FOR ALL USERS is #1 priority, yes, but also access to commerce, sidewalk cafes, goods delivery, utilities, etc., need to be considered. Right-of-way = safe mobility + safe places to be.
- **Equity** – Opportunity to emphasize that the ROW, the streets and sidewalks, are for everyone. New street designs should include accessibility for the blind community. The City should work with companies to ensure equitable outcomes. Training and education about these devices need to be in multiple languages.
- **Curb space management** – Important, especially if we are to better integrate micro-mobility for goods delivery (e-trikes and delivery bots).
- **Better parking requirements** – Need better parking regulations for e-bikes and potential other emerging mobility devices. Designated parking, especially at intersections, could be helpful. Take first car parking space nearest intersection and turn into bike and micro-mobility parking zone.
- **(De)Congestion pricing can help reduce number of vehicles** – Opportunity to repurpose or upgrade car travel lanes into protected bike and micro-mobility travel lanes or space for emerging uses.
- **Encourage use of micro-mobility by subsidizing infrastructure** – If we want more people using these devices, potentially subsidizing companies could help.

- **Follow best practices** – Many other cities to learn from. Many other cities have already allowed such devices. Need to learn from them.
- **Data from micro-mobility** – Make sure data from operators is accessible. The City can and needs to learn from the data to help continuously improve the system and services.

## ATTENDEES

### Focus Group

Eric Scheir – Commission for People with DisAbilities

Anna Zivarts – Disability Rights of Washington

Mike Mello – National Federation for the Blind

Corey Grandstaff – National Federation for the Blind and Seattle Transit Advisory Board

Enjoleah Daye – Seattle Transit Advisory Board

Jennifer Tippins – Seattle Pedestrian Advisory Board

Florence Williams – Seattle Bicycle

Advisory Board

Gabe Meyer – Cascade Bicycle Club/

Washington Bikes

Vicky Clark – Cascade Bicycle Club/

Washington Bikes

Glen Buhlman – Seattle Neighborhood Greenways

Tom Lang – Seattle Neighborhood Greenways

### City of Seattle

Holly Delcambre – Citywide ADA Title II

Compliance Project Manager

Lorraine Phillips – Assistant City Attorney

Councilmember Mike O'Brien (listen only)

### SDOT Project team

Radcliffe Dacanay

Ian Macek

Joel Miller

Kelly Rula

### Listen Only

Alejandro Chouza - Jump

Jonathan Hopkins - Lime

Jewls Krueger - Lyft

Doug MacDonald – general public

The Seattle Department of Transportation  
700 5th Avenue, Suite 3800  
PO Box 34996  
Seattle, WA 98124-4996  
(206) 684-ROAD (7623)  
[www.seattle.gov/transportation](http://www.seattle.gov/transportation)



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